

4. RECOMMENDATIONS

Contamination with metals above the LOC was found in virtually every HA and building area of TA-3-141. However, gross contamination was noted consistently only in the exhaust ventilation system and the beryllium processing areas. The extent of this contamination is summarized in Fig. 4.1. Contaminants most often noted above the LOC include beryllium, copper, and lead. Many other metal contaminants were also noted that may occur as frequently; however, they were not surveyed as rigorously.

The purpose of characterizing TA-3-141 is to provide health and safety guidance to the demolition and reconfiguration contractor responsible for reconfiguration of the building. Based on the type, concentration, and location of contaminants found in the building, recommendations are provided for the following:

- suggested monitoring during construction activities,
- PPE for construction workers,
- removal of equipment and structures, and
- physical hazard planning.

To help implement these recommendations, building drawings showing the general location of contaminants in TA-3-141 were developed and are included as Figs. 4.2 through 4.5. The first two drawings depict contamination levels on the first and second floor, and the last two drawings show contamination associated with the ventilation system.

4.1 RECOMMENDED MONITORING

Because contamination was noted throughout the building, it is recommended that personal air monitoring be conducted while working in all areas of the building. When establishing the LOCs, it was assumed that radiological monitoring would be conducted routinely in all areas where work was being performed. This will also include the roof because samples from this area were found to contain thorium. However, routine monitoring for metals should not be necessary while working on the roof.

Because elevated concentrations of lead were found throughout the building, routine monitoring for airborne metal contamination should be conducted while working in the building. Should the lead standard be executed (i.e., $35 \mu\text{g}/\text{m}^3$), then the special requirements dictated by Occupational Safety and Health Administration will have to be followed. Because gross contamination levels with lead were normally not encountered except in the exhaust ventilation

Item	Building Area			
	Office	Radiological/ Process	Beryllium	Roof
Paint	●	●	●	NA
PCB				
Walls		●	●	NA
Rotating		●*	●	NA
Horizontal <6 ft	NA	●	●	NA
Horizontal >6 ft	●	●	●	NA
Ventilation supply	●	●	●	NA
Exhaust ventilation	NA	●	●	NA
Built-up roof	NA	NA	NA	●

Blank - no contamination found above level of concern

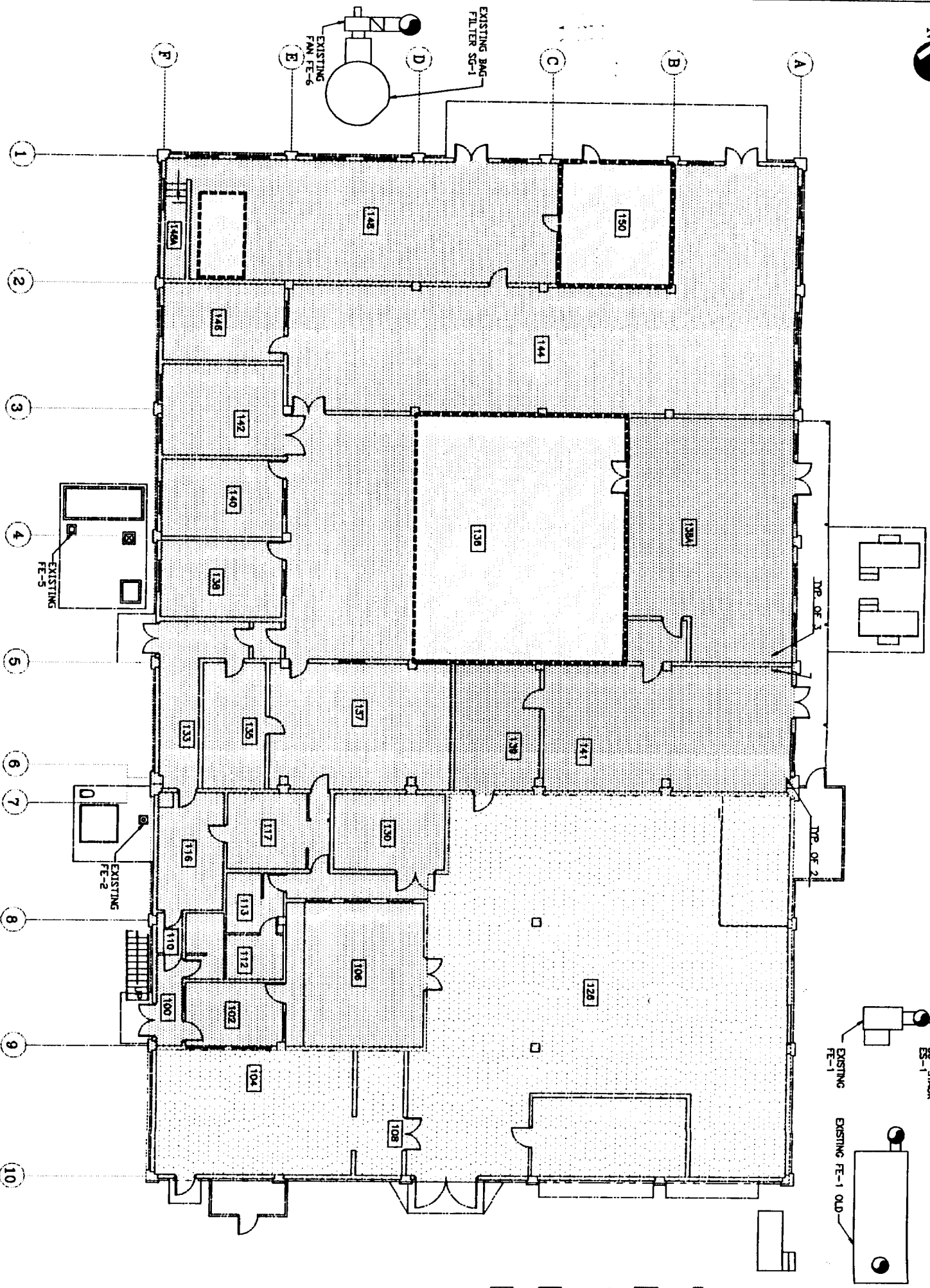
NA = not applicable

Blue - Surface Contamination Level of Concern

Red - Gross Contamination Level of Concern

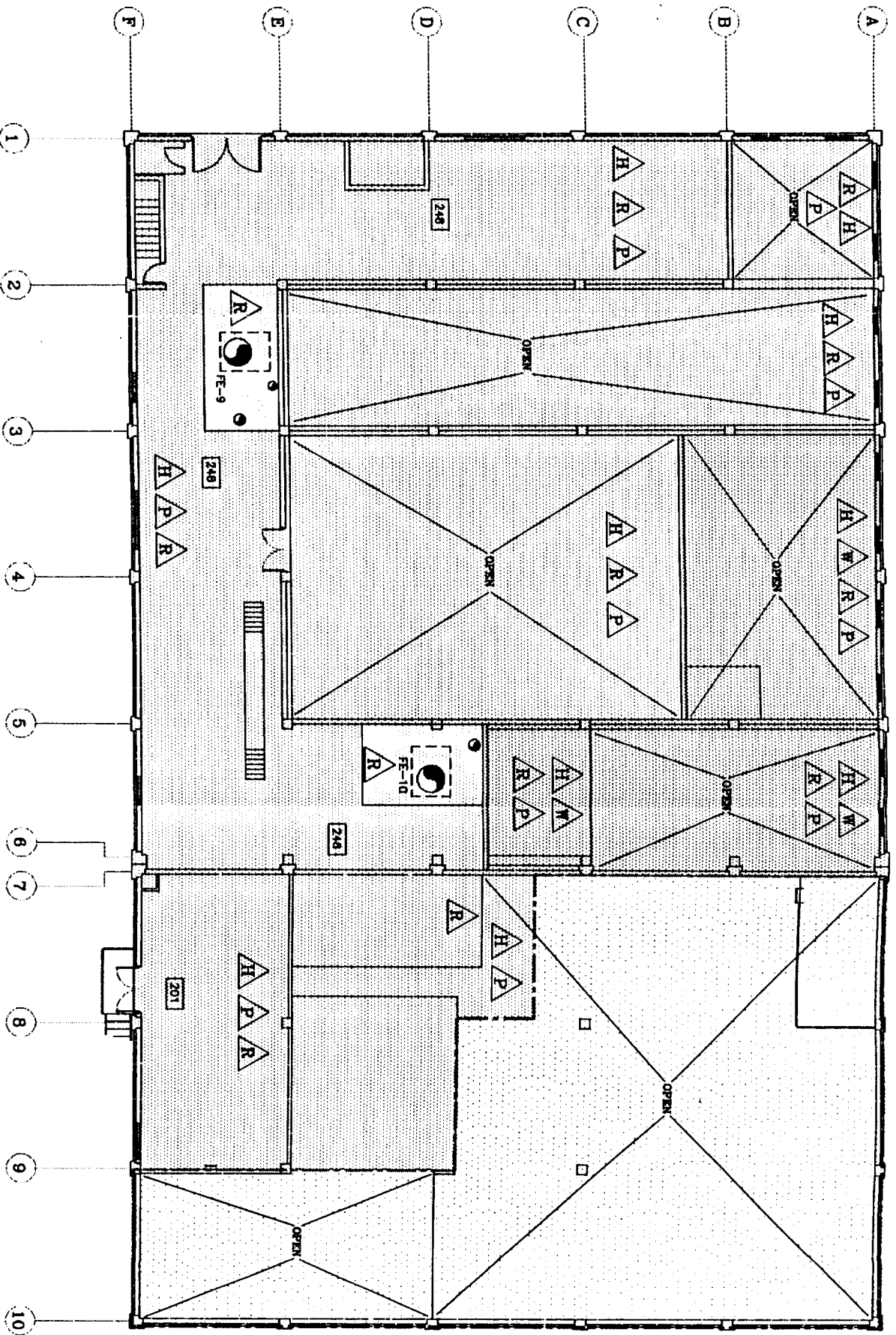
*Gross contamination in mezzanine area only.

Fig. 4-3. Relative levels and locations of contaminants in TA-3-141.

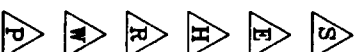


FIRST FLOOR - ROOM CONTAMINATION PLAN

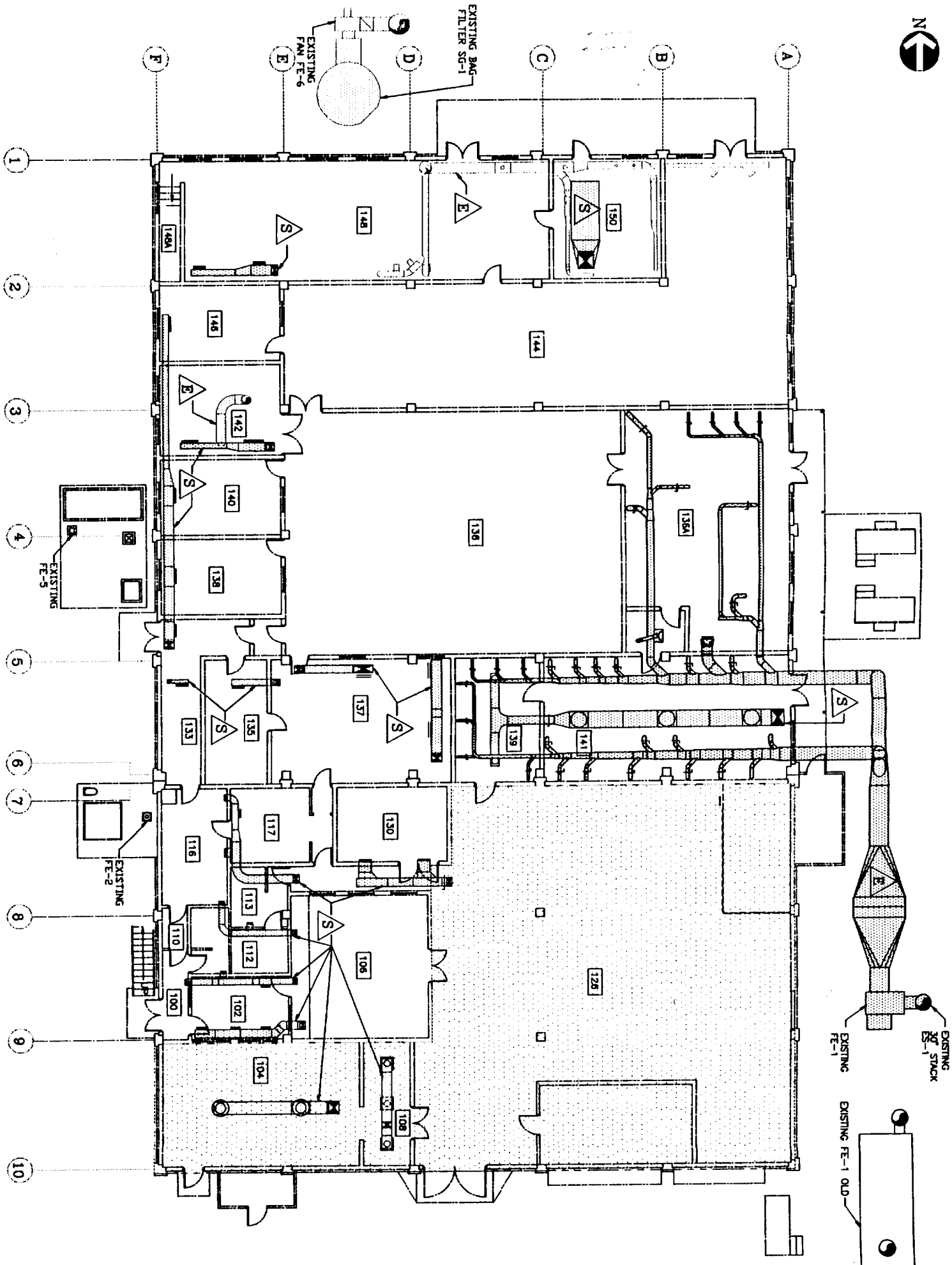
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MEZZANINE - ROOM CONTAMINATION PLAN





MEZZANINE - VENTILATION SYSTEMS CONTAMINATION PLAN

system, concerns with the lead standard should not be necessary except when working with the exhaust ventilation system. In addition to lead, it is recommended that beryllium, nickel, thorium, uranium, and vanadium be monitored routinely. It is further recommended that routine personal air monitoring be conducted initially for these metals while working in all areas of the building. If personal air monitoring results indicate that some of these elements are not a concern while working in a particular area of the building, then less rigorous monitoring may be adopted.

In addition to the metals discussed above, it is recommended that other metals be monitored while working with the exhaust ventilation system and in the process areas. While working with the exhaust ventilation system, these additional elements should be monitored routinely. Routine monitoring may not be necessary in the general process areas; however, enough monitoring should be conducted to establish a baseline. If any of these elements are detected regularly during initial personal air monitoring at a level approaching or exceeding the TLV, then they should be included as part of the routine monitoring regime. These additional elements include:

- arsenic,
- barium,
- cadmium,
- chromium,
- cobalt,
- copper,
- molybdenum, and
- yttrium.

Figure 4.1 indicates those areas of the building where gross contamination was noted. It is probably safe to assume that respiratory protection will be necessary when working with grossly contaminated materials; however, personal air monitoring will probably show that respiratory protection is not necessary when working in the other areas. Therefore, it is probably safe to assume that PPE, including respiratory protection, will be needed for the first day when working in these areas, but not later.

4.2 RECOMMENDED PPE

The level of PPE recommended depends on the area in the building where the activity will take place, the type of activity, and the equipment/structure being removed or repaired. In general, some level of contamination was found throughout the building. However, the office areas tended to have less contamination above the LOC than the other areas, although lead contamination was found consistently at elevations above 6 ft. In addition, beryllium concentrations above the LOC were found consistently in the beryllium process areas.

For the most part it was assumed that activities that could raise dust (e.g., abrasive blasting and torch cutting) would be minimized or avoided and that in areas containing gross contamination the selected removal method would minimize the possible release of dust into the air. Based on these assumptions, Table 4.1 lists the recommended PPE. The recommended PPE indicated in this table is on the conservative side. Therefore, it is also recommended that personal monitoring be conducted while the construction crew is working. If personal monitoring indicates that exposure of the construction crew is consistently below the TLV, then the level of PPE may be downgraded (see note on Table 4.1). However, periodic personal monitoring should continue to verify that personnel are not exposed to contaminants above allowed limits.

4.3 RECOMMENDED EQUIPMENT/STRUCTURE REMOVAL METHODS

The major source of gross contamination is associated with the exhaust ventilation system. Therefore, it is recommended that the exhaust ventilation system be one of the last items removed to prevent contamination associated with it from being spread to noncontaminated items. In addition, it is recommended that mobile and semi-mobile equipment and furniture be removed to minimize potential physical hazards and the spread of contamination.

The recommended removal method for equipment and structures is divided into six major activities.

- removal of equipment and furniture with no apparent contamination,
- removal of mildly contaminated equipment and furniture,
- removal of grossly contaminated equipment,
- removal of building structures with no apparent contamination,
- removal of mildly contaminated building structures, and
- removal of grossly contaminated building structures.

Equipment and furniture with no apparent contamination (e.g., office desks, cabinets, chairs, and computers) should be removed from the building first. Consideration may be given to enclosing objects in plastic (e.g., plastic bag) before they are removed from their relatively noncontaminated area to prevent them from becoming contaminated during the removal and storage process.

Equipment and furniture with mild contamination that is not associated with the exhaust ventilation system should be removed next. It is recommended that these objects be enclosed with plastic before they are removed. This will not only prevent the spread of contamination from those items to other objects but will prevent further contamination during the removal and storage process. Cleaning of furniture and equipment should be considered prior to their removal. By cleaning them prior to removal, any contamination released during the cleaning process would be in the building before it is renovated.

Table 4.1. LANL TA-3-141 renovation—suggested personal protective equipment

Major renovation activities					Initial PPE	Area/Item
Remove process equipment > 6 ft	Remove process equipment < 6 ft	Remove fixtures	Gross decontamination	Final decontamination		
—	—	D	C1	D	C1	Office
C1	C1	C1	C1	C1	C1	Process
C1	C1	C1	C1	C1/D	C1	Radiological
C2	C2	C2	C2	C2	C2	Beryllium
C1	C1	—	C1	C1	C1	Old FE-1
C2	C2	—	C2	C1	C2	New FE-1
C1	C1	—	C1	C1	C1	FE-6
C1	C1	—	C1	C1	C1	FE-9
C1	C1	—	C1	C1	C1	FE-10

PPE Set-up C1 Radiological/Metal PPE

Full-face respirator
Protective clothing (1 layer)
Gloves (2 layers)
Safety shoes
Hard hat
Eye protection
Periodic exposure monitoring

PPE Set-up C2 (Beryllium Area PPE)

Full-face respirator
Beryllium coveralls
Protective clothing (2 layers)
Gloves (2 layers)
Hard hat
Safety shoes
Eye protection
Exposure monitoring

1. For PPE Set-up C1, downgrade to PPE Set-up D if personal monitoring indicates exposure levels are statistically below action levels.
2. Personal exposure monitoring will be statistically based and periodically verified for each activity conducted.

Notes:

Grossly contaminated equipment should be the last equipment removed. Gross contamination associated with equipment is generally contained within the equipment (i.e., internal surfaces). Therefore, if the equipment is enclosed with plastic prior to its removal, any contamination associated with it may be contained. Some equipment is connected to the exhaust ventilation system, which contains gross contamination. Therefore, extra precautions must be taken when disconnecting equipment from this system. As with mildly contaminated equipment, if it is desired to reuse the grossly contaminated equipment, cleaning such equipment prior to its removal should be considered.

Some building structures slated for removal have little or no contamination associated with them. These should be the first building structures removed. These structures include portions of the supply ventilation system and some parts of the piping, electrical conduit, bus bar, and lighting systems. Except for the supply ventilation system, contamination associated with the other systems is generally located on the outside of the object. Therefore, if the outside of these components are cleaned prior to their removal, special packaging and handling due to their level of contamination may be avoided.

Building components with mild contamination should be removed next. It is felt that this will entail removal of visible dust. Three approaches that may be considered for removing these components would be cleaning the object prior to removal (applicable only when contamination is on accessible surfaces), enclosing the object in plastic prior to removal, and encapsulating the object with an appropriate encapsulating agent. By cleaning, enclosing, or encapsulating the object, the spread of contamination from the object may be eliminated or minimized during the removal process.

Grossly contaminated building structures are mostly associated with the exhaust ventilation ductwork. These components should be the last ones removed from the building. Special care is required when dismantling these components due to the quantity and mobility of the contamination associated with them. A number of approaches may be taken, including enclosing the ductwork in plastic prior to and during dismantlement, removal of gross quantities of dust inside the ventilation system, and using an encapsulating agent to keep the contamination in place. The most grossly contaminated ductwork noted during the survey is FE-9. FE-6 also contains much contamination, especially near the baghouse. FE-10 does not contain as much gross contamination; however, it is suspected that gross contamination exists within FE-10 at certain low points within the system. The cleanest ductwork from a gross-dust standpoint is probably the new FE-1. However, since this system is used in the beryllium areas, a small quantity of contamination could create major health and safety concerns. Therefore, special care should be taken when removing this system.

Torch cutting of materials potentially contaminated with metals is strongly discouraged. This will create a potential for worker exposure to toxic metal fumes. Strong justification and exceptional

precautions should be invoked if torch cutting is performed. Cold cutting is the preferred method for dismantling potentially contaminated structures.

4.4 PHYSICAL HAZARDS PLANNING

A number of potential physical hazards were identified during the survey that should be considered during the reconfiguration process. The most prevalent potential hazards identified include:

- confined spaces,
- open/damaged electrical conduit,
- open/damaged bus bar,
- unlevel floors,
- poor/absent guardrail or handrail,
- deficient ladder,
- poor lighting,
- poor ventilation,
- elevated objects requiring removal,
- pressurized systems, and
- lockout/tagout requirements.

Appropriate worker training and planning during the renovation work can minimize impacts from these and other physical hazards. The locations for these hazards are provided in Table 3.21, and further detail on the type and location is provided in Appendix B. It should be noted that other physical hazards could be introduced depending on the demolition procedures employed.

4.5 BUILDING DECONTAMINATION PRIOR TO RECONSTRUCTION

Consideration should be given to contaminants left behind in the building once all components have been removed. In order to ensure that the new tenants are adequately protected, residual contaminants that they could be exposed to should be removed or encapsulated. Contaminants of concern include those discussed in Sect. 4.1.

In addition, consideration should be given to implementing an Operations and Maintenance Program that would document and establish procedures that would prevent future occupants and maintenance personnel from inadvertent exposure due to contamination left in the building, especially materials such as paint that are likely to be left in place.